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MINISTRY OF SUPPLY

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT

BOSCOMBE DOWN

PROVOST T. MK.1 (VARIANT) VW.614

BOMBING EVALUATION TRIALS

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4th Part of Report No. A.A.E.E./875/2

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT
BOSCOMBE DOWN

-8 MAR. 1955

Provost T. Mk.1 (Variant) VW.614

Bombing Evaluation Trials

A.& A.E.E. Ref: 5984/3
M. O. S. Ref: 7/Armt/1338
Period of trial: June - October, 1954

Summary

1. Evaluation trials of the bombing installation in Provost T. Mk.1 (Variant) aircraft, VW.614, have now been completed.

2. Subject to the modifications in para.6.1.1 to 6.1.4 being incorporated, it is recommended that Provost T. Mk.1 aircraft be accepted for the carriage and release of 250 lb. G.P. Mk.4 and 25 lb. practice bombs as follows:-

2.1 Carriage. Up to 250 knots I.A.S. with manoeuvres up to +5'G' indicated.

2.2 Release. In straight and level flight and in angles of dive up to 70 degrees at speeds up to 250 knots I.A.S.

Note:- Heights of release varied between 1,800 ft. and 1,500 ft. in dives and 350-500 ft. in straight and level flight.

This Report is issued with the authority of

Air Commodore,
Commanding A.& A.E.E.

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/Introduction.....

1. Introduction

1.1. Evaluation trials of the bombing installation of Provost T. Mk. 1 aircraft as requested by Ministry of Supply trials pro-forma 7/Armt/1338 dated 5th May, 1954, have been completed.

2. Object of trial

2.1. The object of the trial was to clear the bombing installation for the carriage and release of 25 lb. practice and 250 lb. bombs to the maximum permissible speed in straight and level flight and in angles of dive up to 70 degrees.

3. Description of Installation

3.1. Bombing Controls

3.1.1. Control Panel. An armament control panel is installed above the front coaming in the cockpit; it has the following switches:-

(i) Master switch. When placed to OFF, the bombing electrical circuit is completely isolated.

(ii) Selector Switches. There are two switches labelled PORT - STARBOARD. These switches permit the choice of release of bombs from the port or starboard or both carriers.

(iii) Fuzing Switches. There are two switches labelled NOSE - TAIL. These switches permit the choice of fuzing nose or fuzing tail or both.

(iv) Single/Salvo and Distributor Switch. This switch permits the choice of single or salvo release (depending on s elector switching) or distributor. When the distributor is selected there is a 0.3 second interval between the release of the bombs.

(v) Pupil/Pilot Selector Switch. This switch determines which firing button (one on each control column) is operative.

3.2. Safety and Test Switches

3.2.1. Micro Switches. Power to the armament electrical services is taken through two micro-switches which are connected in series and situated in the bottom of each undercarriage leg, see Fig. 1. These switches automatically open when the weight of the aircraft is supported by the undercarriage, thus isolating the armament circuits.

3.2.2. Armament Services Test Switch. An armament services test switch is located in the top of the port undercarriage fairing, see Fig. 3, and when switched to ON short circuits the micro-switches, allowing power to the armament electrical services for ground testing.

3.3. Bomb Carriers

3.3.1. Two carrier units Type EM/EF 100/1000 lb. No. 2, Mk. 1 (Stores Ref. 11A/3207) one on each mainplane for two 250 lb. bombs (see Figs. 1 and 2) or alternatively two Carriers Bomb Light Series Mk. 3 (Stores ref. 11A/572) may be fitted to each mainplane for eight 25 lb. Practice Bombs (see Figs. 3 and 4). These carriers are fully described in A.P.1664A Vol. 1, Sect. 1, Chapters 8 and 9 respectively.

4. Method of Trial

4.1. Ground Examination. The ground examination consisted of:-

4.1.1. Fitting the carriers.

4.1.2. Preparing and loading the stores.

/4.1.3.....

4.1.3. Measurement of clearances.

4.1.4. Checking the electrical circuits.

4.2. Flight Tests

4.2.1. Carriage. Carriage flights were made to ensure that stores remained rigid and safe during all manoeuvres and speeds required for the trial. Gun firing flights were made when 250 lb. G.P. and 25 lb. practice bombs were carried to ensure that ejected cases and links caused no damage to the bombs, carriers and fuzing wires. As the aircraft is not fitted with an emergency manual jettison, the behaviour of the aircraft under asymmetric loading with a 250 lb. G.P. Mk. 4 bomb was determined by progressive steps from take-off.

4.2.2. Release. Release flights were made to ensure that the stores would release and function satisfactorily. All releases were observed and assessed from the ground.

5. Results of Trial

5.1. Ground Examination

5.1.1. 100/1000 lb. EM/EF Carriers. During the initial fitting of 100/1000 lb. carriers the following points were noted and adjusted on the equipment used:-

(i) The two locating studs, fitted to each carrier, which locate in the mating holes in the reaction pads were oversize on diameter and had to be reduced. These studs are parallel-sided with flap tops, and difficulty was experienced when the carrier was being fitted. This fault could be eliminated by fitting tapered studs.

(ii) The locating holes, for the studs, in the reaction pads were out of position in relation to the carrier suspension point and had to be elongated to permit fitting of the carrier.

(iii) The width of the reaction pads had to be reduced by approximately $\frac{1}{4}$ inch and the ends sloped inwards to enable the fairings to be fitted.

5.1.2. Light Series Carriers. The light series carriers were fitted without difficulty; the reaction pads for the 100/1000 lb. carrier did not foul and were left in position.

5.1.3. Preparing and Loading the Stores

(i) Bombs Aircraft 250 lb. G.P. Mk. 4 (inert filled) were fitted with No. 44 nose pistols (Stores ref. 12G/1112) and with No. 75 tail pistols (Stores ref. 12G/1270). The bombs were loaded to the carrier with a Trolley Low Loader (Stores ref. 4G/4515) two chocks were used in conjunction with the low loader to enable the cradle to grip the 250 lb. bomb. A wire safety clip No. 1 Mk. 1 (Stores Ref. 12G/807) and two Safety Clips No. 1 Mk. 1 (Stores ref. 12G/806) were used in both nose and tail arming devices.

(ii) Bombs Practice 25 lb. were prepared and loaded in accordance with A.P. 1661B, Sect. 9, Chap. 1, Appendix 1.

5.1.4. Measurement of Clearanees. Clearance measurements are at Appendix 'A'.

5.1.5. Check of Electrical Circuits.

(i) The cable to the armament services test switch, located in the port undercarriage fairing, fouls the access door aperture when the door is opened and closed. This fault could be eliminated by repositioning the switch.

/(ii).....

(ii) A complete check of all electrical switches and circuits was made before each flight.

Note:- The light series carriers are fitted with auto-selectors and wing clearance in emergency can only be effected by selecting port and starboard stations, placing the master switch ON and pressing the release button four times.

5.2. Flight Tests

5.2.1. Carriage. Seven flights, five with 250 lb. G.P. Mk. 4 bombs and two with 25 lb. practice bombs were successfully flown to the maximum speed and manoeuvre limitations of the aircraft viz. 250 knots I.A.S. and +5 'g' indicated manoeuvres. The aircraft handled satisfactorily when flown with a single 250 lb. bomb. Several dummy dives were made to maximum speed and dive angle with 250 lb. bombs fitted. Guns were fired on three of the flights and the bombs and installation were inspected after each flight. The load was 2 x 250 lb. bombs on two flights and 8 x 25 lb. bombs on the other. Bombs, fuzing wires, carriers and fairings were unmarked by ejected cases and links. See table of carriage flights at Appendix 'B'.

5.2.2. Release. Sixteen 250 lb. G.P. Mk. 4 bombs were successfully released in conditions of flight progressing from straight and level at 100 knots I.A.S. to 70 degree dive at 250 knots I.A.S. The 70 degree dive was started at 4,500 feet above target and the bombs released at 1,800 - 1,500 ft. Thirty-six 25 lb. practice bombs were successfully released in conditions of flight progressing from straight and level at 100 knots I.A.S. to 70 degree dive at 250 knots I.A.S. All bombs released clean and fuzing functioned correctly. See flight release table at Appendix 'C'.

6. Conclusions

6.1. It is concluded that the Provost T. Mk. 1 aircraft is suitable for the carriage and release of 250 lb. G.P. Mk. 4 bombs and 25 lb. practice bombs subject to the incorporation of the following modifications:-

6.1.1. The carrier locating studs are made to the correct diameter, tapered and pointed at the ends to facilitate fitting of the carrier.

6.1.2. The locating holes in the reaction pads are bored in correct alignment with the carrier suspension point.

6.1.3. The width and slope of the reaction pads are corrected.

6.1.4. The armament services test switch is repositioned to prevent damage to the cable when the access door is opened and closed.

7. Recommendations

7.1. Subject to the modifications in para. 6.1.1. to 6.1.4. being incorporated, it is recommended that the Provost T. Mk. 1 aircraft be cleared for the carriage and release of 250 lb. G.P. Mk. 4 bombs and 25 lb. practice bombs as follows:-

7.1.1. Carriage. Up to 250 knots I.A.S. with manoeuvres up to +5 'g' indicated.

7.1.2. Release. In straight and level flight and in angles of dive up to 70 degrees at speeds up to 250 knots I.A.S.

Note: Heights of release varied between 1,800 ft. and 1,500 ft. in dives and 350 and 500 ft. in straight and level flight.

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Provost T. Mk. 1 Clearance Measurements

Store	From Tail of Store to Flap Down		
	Vertical	Horizontal	Nearest Point
(a)	(b)	(c)	(d)
250 lb. G.P. Mk. 4 Bomb	5½"	9½"	5" Centre flap
25 lb. Practice Bomb	6½"	26½"	6½" under main-plane

Note: The clearance angle in roll for both the above stores is 45 degrees.

/Appendix 'B'.....

Appendix 'B' to
4th Part of A.A.E.E./875/2

Provost T. Mk.1 - Bombing Installation

Flight Carriage Table

Flight No. (a)	Store (b)	Details of Test (c)	Remarks (d)
1	250 lb. G.P. Mark 4 Bombs.	Aircraft loaded with two bombs and flown by progressive stages up to maximum speed and manceuvre limitations.	(1) Bombing installation examined after flight - carriers and bombs rigid.
2	- as above -	Aircraft loaded with two bombs and full ammunition. Guns fired to see if ejected cases and links cause damage to bombing installation.	(1) Bombing installation examined after flight - carriers rigid. (2) No damage by ejected cases or links - all ammunition expended.
3	- as above -	- as above -	(1) As above. (2) Stoppages occurred in both guns after approx. 50% ammunition had been expended - no damage.
4	- as above -	Aircraft loaded with one bomb on port wing and flown by progressive stages from take-off to maximum speed and manoeuvre limitations.	(1) Bombing installation examined after flight - carrier and bomb rigid. (2) Test not completed because of weather conditions.
5	- as above -	- as above -	As (1) above.
6	25 lb. practice bombs	Aircraft loaded with eight bombs and flown by progressive stages from take-off to maximum speed and manoeuvre limitations.	(1) Bombing installation examined after flight - carriers and bombs rigid.
7	- as above -	Aircraft loaded with eight bombs and full ammunition. Guns fired to see if ejected cases cause damage to bombing installation.	(1) No damage to bombing installation. (2) All ammunition expended.

Provost T. Mk.1 - Bombing Installation

Appendix 'C' to
4th Part of A.A.E.E./875/2

Flight Release Table

Flight No. (a)	Store (b)	Detail of Test (c)	I.A.S. knots (d)	Release Height feet (e)	Dive angle (f)	Bombing error (g)	Remarks (h)
1	250 G.P. Mk.4 Bomb	Check of bombing installation in flight. Salvo release.	130	500	0°	100x Overshoot	(1) Bombs released clean. (2) Fuzing functioned correctly. (3) Installation undamaged.
2	- as above -	- as above -	160	500	30°	75x Overshoot	- as above -
3	- as above -	Check of bombing installation and assessment of accuracy. Salvo release.	180	500	30°	15x line	- as above -
4	- as above -	- as above -	210	1,400	50°	15x Overshoot	- as above -
5	- as above -	- as above -	220	1,500	50°	10x Undershoot	- as above -
6	- as above -	- as above -	240	1,500	60°	10x Undershoot	- as above -
7	- as above -	- as above -	250	1,500	65°	20x Overshoot	- as above -
8	- as above -	- as above -	250	1,500	65-70°	40x Undershoot	- as above -
9	25 lb. Practice Bomb	Check of bombing installation in flight. Single release.	130	350	0°	100x Average	(1) Bombs released clean. (2) Test abandoned after five bombs because of weather condition.

/contd

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
10	- as above -	- as above -	130	500	0°	15x Average	(1) Bombs released clean. (2) One bomb failed to release because of over-crutching.
11	- as above -	Check of bombing installation in flight and assessment of accuracy. Single release.	200	1,500	60°	7¾x Average	(1) Bombs released clean.
12	- as above -	Check of bombing installation in flight and assessment of accuracy. Paired release.	240	1,600	60°	7 x Average	- as above -
13	- as above -	- as above -	250	1,600	65-70°	8 x Average	- as above -

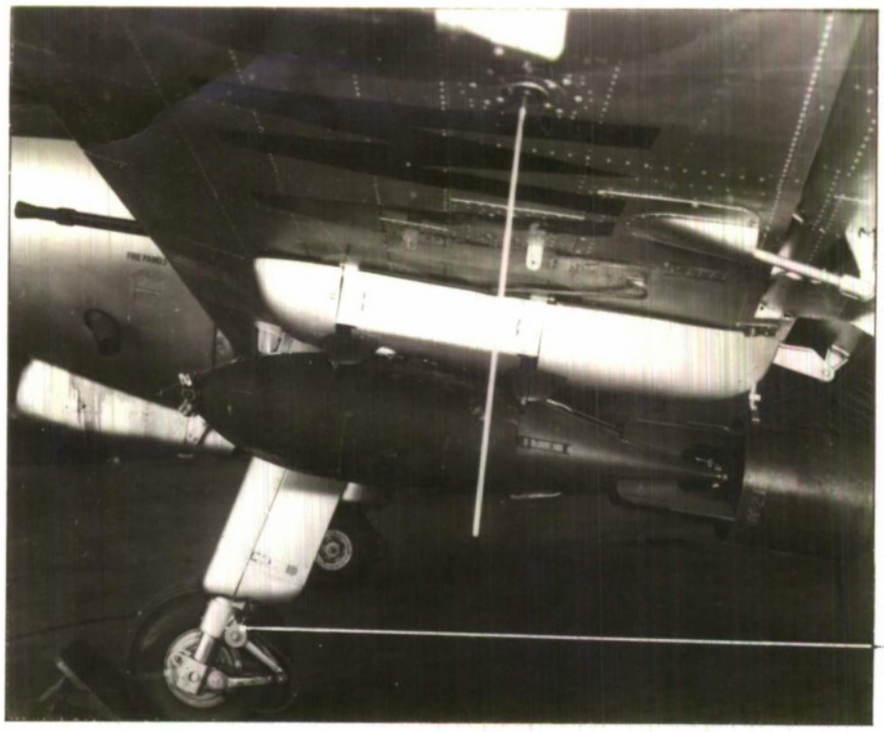

FIG.1. 250 LB. GP MK.4 BOMB ON 100/1,000 LB. CARRIER UNIT WITH FAIRINGS FITTED.

FIG.2. 250 LB. GP MK.4. BOMB. FRONT VIEW.

PROVOST MK.1 BOMBING INSTALLATION.

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FIG. 3. 25 LB. PRACTICE BOMB ON LIGHT SERIES CARRIERS.

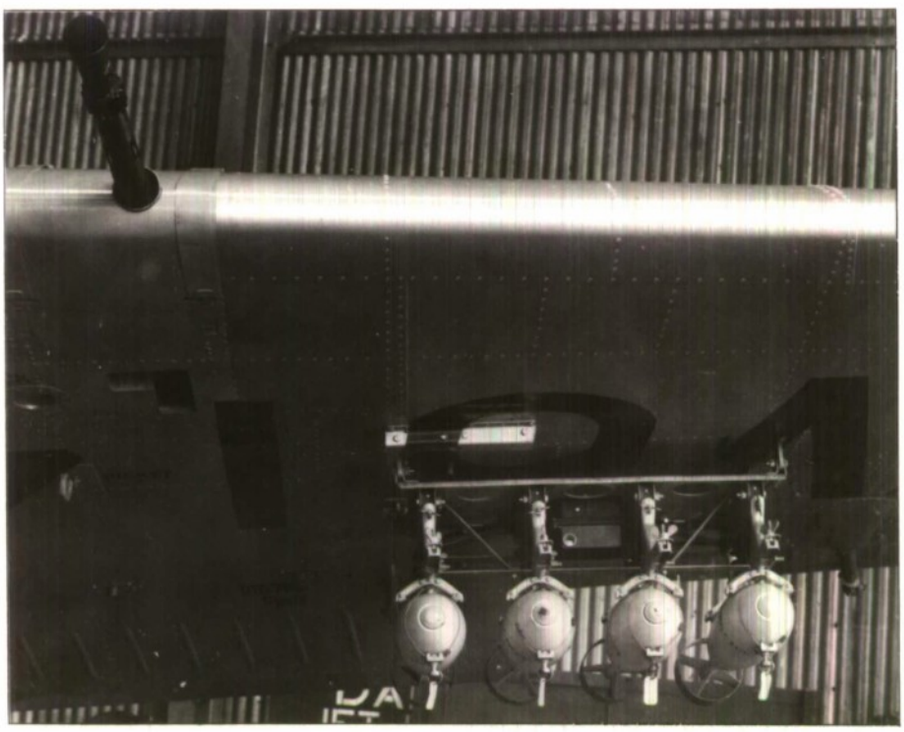

FIG. 4. 25 LB. PRACTICE BOMBS, FRONT VIEW.

PROVOST MK.I. BOMBING INSTALLATION.

A.&A.E.E. NEG. Nº 16148

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